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Cynthia J. Frei 5/10/05

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Applicant: S. Steven Carl et al
Title: COUNTERMEASURE WASHDOWN SYSTEM CLEANING
Art Unit: 1746
Examiner: Saeed T. Chaudhry
Conf. No: 4427

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DECLARATION OF S. STEVEN CARL UNDER RULE 132

S. Steven Carl declares as follows:

(1) I am a coinventor named in the above identified application and this Declaration is offered in support of the patentability of the pending claims.

(2) I was present at the interview on August 17, 2004 with Examiner Chaudhry and my counsel, David J. Josephic.

(3) The pending claims as directed to a method of chemically treating countermeasure washdown systems (CMW Systems) on board ships were discussed in relationship to the cited prior art. I explained to Examiner Chaudhry the nature of the existing problems of the CMW Systems prior to the invention covered by the claims in my application above identified. I developed

the problems associated with the CMW Systems in connection with my experience in the field related to blockages resulting from corrosion and biofouling of the pipes. For examples, mussels, oysters and clams are the predominant species that cause biofouling and their threadlike tentacles enable them to attach themselves to the pipe wall and to "stack up" upon themselves to cause blockages. Other microscopic life stages such as larvae, mollusks, barnacles, sponges, etc., also result in blockages, as developed in the Background of this invention at pages 1-6.

(4) As explained in the Summary of the Invention at page 6 of the specification, in accordance with the main claim 26, the pH of the acidic cleaning solution is introduced in the section at about 2 to about 2.2, monitored and maintained during cleaning of the section. It is important to maintain the pH between about 2 to 2.2 in order to achieve the objectives of the invention. In practice, we have found that the claimed pH range was important in effectively cleaning the CMW System which contained marine scale without damaging the aluminum piping.

(5) This Declaration is offered in further support of patentability of main claims calling for the critical pH range in order to achieve the objectives of the invention and differentiate over prior art being cited. For this purpose, the following experiments were conducted under my supervision to demonstrate

the criticality of the pH of the cleaning solution as provided by the claims as follows.

(A) Two different concentrations of PIPE-KLEAN C Preblend were formulated. As set forth in the specification at page 14, line 9, PIPE-KLEAN C is a solution of citric acid in water. These concentrations were formulated to look at the corrosive effects on aluminum, the dissolution rate on calcium carbonate and what effect they would have on mussel shells. A concentrated solution of PIPE-KLEAN C Preblend was prepared and from that stock solution, a 5% solution was made by just diluting with water and a 30% solution was also prepared by diluting the concentrated solution with water. It was found that the pH of the 5% solution was 2.25 and for the 30% solution it was 2.0.

(B) Aluminum coupons (alloy AL6061) were taken, weighed and immersed in the two solutions. The samples were run at ambient temperature and with mild agitation to simulate flow as in cleaning the pipe on board ship. The samples were run for two weeks, removed from their respective solutions, rinsed with DI water and reweighed.

(a) 5% PIPE-KLEAN C Preblend (pH 2.25)-0.26% weight loss

(b) 30% PIPE-KLEAN C Preblend (pH 2.00)-0.50% weight loss

(C) One gram of reagent grade calcium carbonate was placed in each of six beakers. To three of the beakers, 150 ml each of 5% PIPE-KLEAN C Preblend was added and to the other three beakers 150 ml of the 30% PIPE-KLEAN C Preblend was added. Again, simulating on board ship cleaning, mild agitation was applied to each and the solutions were allowed to react. At the end of four hours, the solutions were filtered, filter paper dried in an oven overnight and then reweighed.

(a) 5% PIPE-KLEAN C Preblend (pH 2.25)-75% dissolved

(b) 30% PIPE-KLEAN C Preblend (pH 2.00)-81% dissolved

(D) Several different mussel shells were taken and one half was completly submerged in a 5% PIPE-KLEAN C Preblend solution and the other half was placed in a 30% PIPE-KLEAN C Preblend solution. Again, with mild agitation being applied to all test samples, the reactions were conducted over a two week period. At the end of that time, the shells were removed from the solutions, rinsed with deionized water and reweighed.

(a) 5% PIPE-KLEAN C Preblend (pH 2.25)-66% dissolved

(b) 30% PIPE-KLEAN C Preblend (pH 2.00)-86% dissolved

(E) Based upon the above testing and consistent with my field experience on board ships, several conclusions can be made. As the concentration of the PIPE-KLEAN C Preblend solution is increased from 5% to 30%, there is a decrease in pH from 2.25 to 2.0. It has also been shown in the three tests above that as the solution becomes more acidic, or pH is lowered, the solution gets more aggressive toward aluminum alloys. It also gets more aggressive by dissolving more calcium carbonate as well as mussel shells. In support of my experience in the field on board ships, if one were to formulate a solution with a pH higher than 2.25 to lessen the corrosivity toward aluminum, then one will have a solution that will not be able to dissolve much calcium carbonate or mussel shells. At the same time, if one were to decrease the pH of a solution below 2 to be more effective in dissolving calcium carbonate or mussel shells, then the corrosivity of aluminum increase which would be unacceptable.

pH of PIPE-KLEAN C Preblend		
5%	-	2.25
10%	-	2.20
20%	-	2.05
30%	-	2.00
100%	-	1.60

(E) Accordingly, in support of independent claim 26 and dependent claims, supplementing the disclosure in the specification at page 6, lines 14-16, it is critical to maintain the pH in the method of this invention as claimed on the order of about 2 to about 2.2 to achieve the objectives of the invention. Further, as the claims also require, the pH is monitored and maintained during cleaning to effectively clean pipe sections.

(6) I have also read the accompanying amendment and I am in agreement with the claimed differences urged over the cited prior art. For all of the above reasons, the claims in this application are considered to differentiate over cited prior art and, it is respectfully submitted, are unobvious to a person of skill in the art.

(7) I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the subject application or any patent issued thereon.

4/29/2005
Date

S. Steven Carl